ice thorn Carychium exile Photo © 2008, Marla L. Coppolino

I I I I I I S

Snails (f.) Iuqs



Roger's snaggletooth Gastrocopta rogersensis Photo © 2008, Marla L. Coppolino



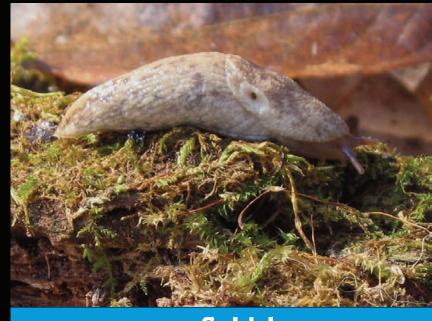
broad-banded forestsnail Allogona profunda Photo © 2008, Marla L. Coppolino



tigersnail Anguispira alternata Photo © 2008, Marla L. Coppolino



dusky arion Arion subfuscus Photo © 2008, Marla L. Coppolino



gray fieldslug Deroceras reticulatum Photo © 2008, Marla L. Coppolino



Iowa Pleistocene snail Discus macclintocki Photo © 2008, Marla L. Coppolino



brittle button Mesomphix friabilis Photo © 2008, Marla L. Coppolino



carinate pillsnail Euchemotrema hubrichti Photo © 2007, Eric Johnson



gray-foot lancetooth Haplotrema concavum Photo © 2008, Marla L. Coppolino



whitewashed rabdotus Rabdotus dealbatus

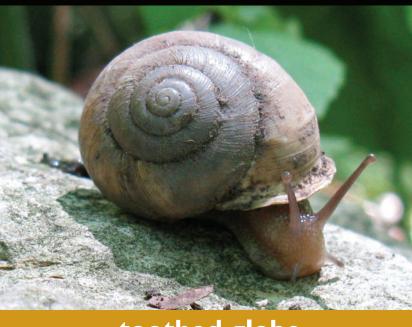
Photo © 2009, Jochen Gerber, The Field Museum of Natural History



compound coil Helicodiscus parallelus Photo © 2009, Marla L. Coppolino



depressed ambersnail Oxyloma peoriense Photo © 2009, Jochen Gerber, The Field Museum of Natural History



toothed globe Mesodon zaletus Photo © 2008, Marla L. Coppolino



Philomycus carolinianus Photo © 2008, Marla L. Coppolino



small spot Punctum minutissimum



thin-lip vallonia Vallonia perspectiva Photo © 2008, Marla L. Coppolino



armed snaggletooth Gastrocopta armifera Photo © 2008, Marla L. Coppolino



globose dome Ventridens ligera Photo © 2008, Marla L. Coppolino



striped whitelip Webbhelix multilineata Photo © 2008, Marla L. Coppolino

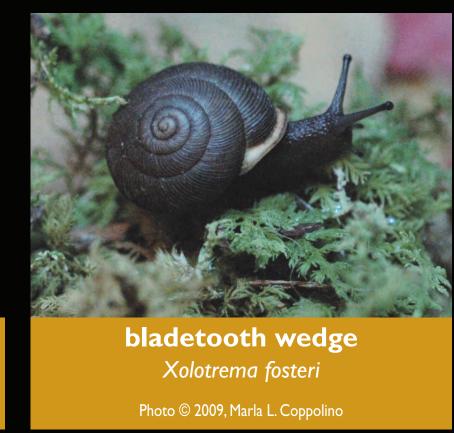


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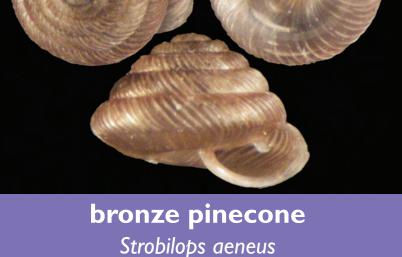
cherrystone drop Hendersonia occulta Photo © 2009, Jochen Gerber, The Field Museum of Natural History



Paravitrea significans Photo © 2009, Jochen Gerber, The Field Museum of Natural History



Photo © 2009, Jochen Gerber, The Field Museum of Natural History



and snails and slugs, hereafter referred to as "land snails" or "snails," are among the Least-studied groups of animals and are commonly misunderstood to be pests or undesirable creatures. While it is true that some snails, particularly species introduced from other areas, can be damaging to crops or the environment, the snails native to an area play an essential role in the functioning of its ecosystem. Numbering almost 40,000 species worldwide, land snails are found in nearly every type of habitat, from tropical rain forests to mountains, arctic regions and deserts. Land snails are abundant in Illinois. They are represented by approximately 124 species, ranging in size from about 0.05 inch to approximately 1.80 inches.

These organisms, as well as aquatic snails, are members of the Class Gastropoda, a classification category meaning "stomach-foot." They move on their ventral side on a large, muscular foot. For those gastropods with a shell, their organs are located in a visceral sac that is covered with mantle tissue, inside the shell. Gastropods are part of a larger group of animals, the Mollusks, that includes clams, mussels, limpets, chitons, scaphopods, octopuses, squids and others.

Glossary words defined on back of poster.

Species List Species are not shown in proportion to actual size.

> KINGDOM ANIMALIA Phylum Mollusca Class Gastropoda

Family Agriolimacidae gray fieldslug Deroceras reticulatum (Müller, 1774) Family Arionidae

(Draparnaud, 1805) Family Cochlicopidae Appalachian pillar Cochlicopa morseana (Doherty, 1878) Family Discidae

tigersnail Anguispira alternata

dusky arion Arion subfuscus

(Say, 1816) Iowa Pleistocene snail Discus macclintocki (F. C. Baker, 1928) ice thorn Carychium exile I.

Lea, 1842 Family Gastrodontidae globose dome Ventridens ligera (Say, 1821) Family Haplotrematidae

concavum (Say, 1821)

gray-foot lancetooth Haplotrema

cherrystone drop *Hendersonia* occulta (Say, 1831) Family Helicodiscidae

compound coil Helicodiscus parallelus (Say, 1817) Family Orthalicidae whitewashed rabdotus Rabdotus dealbatus (Say, 1821) Family Oxychilidae brittle button *Mesomphix* friabilis (W. G. Binney, 1857)

domed supercoil Paravitrea significans (Bland, 1866) mily Philomycidae Carolina mantleslug *Philomycus* carolinianus (Bosc, 1802)

amily Polygyridae broad-banded forestsnail Allogona profunda (Say, 1821) carinate pillsnail *Euchemotrema* hubrichti (Pilsbry, 1940) toothed globe Mesodon zaletus (A. Binney, 1837)

striped whitelip Webbhelix multilineata (Say, 1821) bladetooth wedge Xolotrema fosteri (F. C. Baker, 1921) Family Punctidae minutissimum (I. Lea, 1841) Family Strobilopsidae

bronze pinecone Strobilops aeneus Pilsbry, 1926 Family Succineidae depressed ambersnail Oxyloma peoriense (Wolf, 1894) amily Valloniidae thin-lip vallonia *Vallonia*

perspectiva Sterki, 1893 armed snaggletooth Gastrocopta armifera (Say, 1821) Roger's snaggletooth Gastrocopta rogersensis Nekola and Coles, 2001

This poster was made possible by:

Appalachian pillar

Cochlicopa morseana



Illinois Department of **Natural Resources** Division of Education



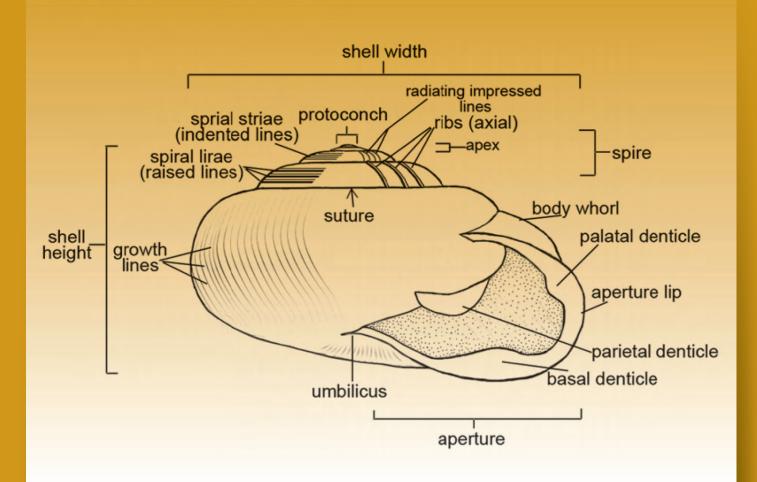
Illinois Wildlife Preservation Fund

Text: Marla L. Coppolino, Graduate Research Assistant, Southern Illinois University, Carbondale, under U.S. Fish and Wildlife Service/Illinois Department of Natural Resources State Wildlife Grant T-32-P. A quantitative study of land snail diversity across multiple habitat types in southern Illinois.

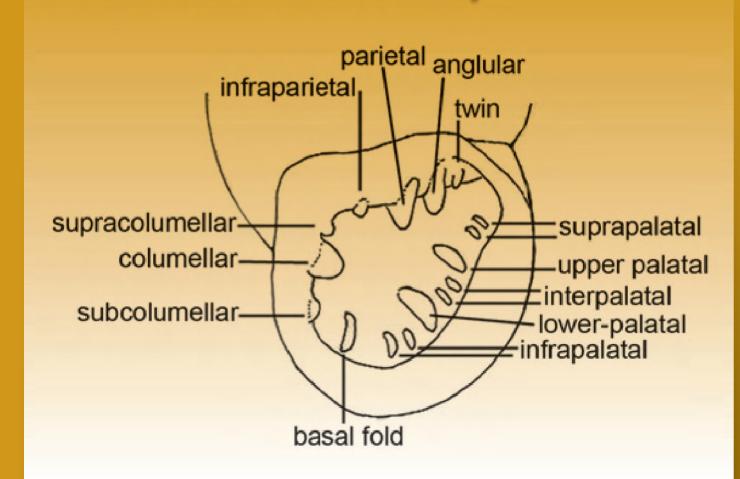
> Funding for this poster was made possible in part by contributions to the Illinois Wildlife Preservation Fund.

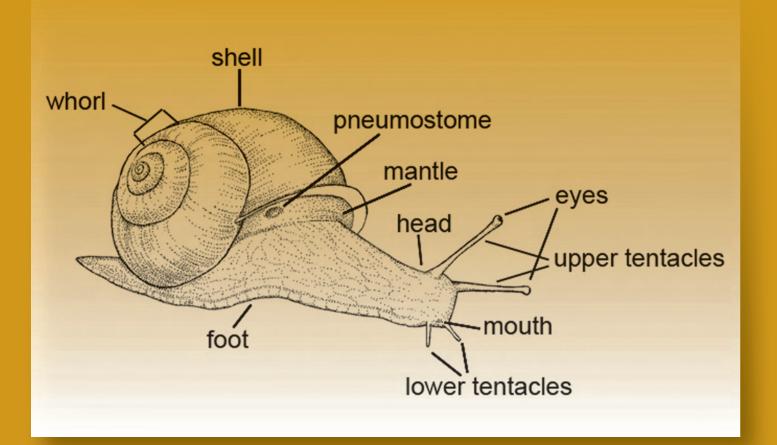
Smails & Slugs

Shell structure



External snail anatomy





Illustrations by Marla L. Coppolino

Anatomy

Snails have a complex system of organs. The mouth contains a **radula**, a flexible, ribbonlike structure lined with rows of teeth, used to scrape food. On the snail's head are **tentacles**, which serve as chemosensory structures. Most snails in Illinois have an eye at the tip of each upper tentacle. All internal organs are contained within the **mantle**, inside the shell. Food travels through a digestive system consisting of a stomach, digestive gland and intestine. The circulatory system is semi-closed and has a heart with one **ventricle** and one **auricle**. Breathing is accomplished by drawing air through the **pneumostome**, a small opening in the mantle. Gas exchange occurs within the mantle cavity.

A snail's shell develops in the egg along with the rest of its body and continues to grow until the snail reaches sexual maturity. The shell is formed by deposits of calcium laid down by the mantle. As the shell grows in its coiled shape, **whorls** are added. A snail cannot leave its shell. It has a strong muscle inside that is firmly attached to the shell. Snail shells grow in a variety of shapes, including **discoid**, **conical** and beehive. Shell shape, number and type of whorls and shell ornamentation, such as ribs or hairs, aid in identification of species. Some snails have **denticles**, or "teeth," that protrude towards the center of the shell opening to prevent insect predators from entering and eating the snail. Snail shells may persist long after the snail has died and often can be used to identify species. Slugs have either a much reduced shell, located under the mantle on the **dorsal** side, or no shell.



Conservation

In today's rapidly changing world, land snail populations are susceptible to decline. Snails are particularly affected in areas where acid rain is prevalent. The acidic soil contains less-than-normal amounts of available calcium that snails need for proper growth and life functions. A research study in Europe documented reduced populations of certain types of forest-dwelling birds attributed to reduced populations of their main food source, land snails. Acidic rainfall led to the decline in snails, and the decline in the bird populations followed. Other threats to snails include habitat loss due to agricultural use or construction and the application of salts and chemicals to roads in the winter. It is believed that forest fires and floods can be detrimental to populations of land snails, too.

Unfortunately, some snail species living in North America are not native. These nonnative species are mainly from Europe, arriving in shipments of food or plants and escaping to establish populations. Some do little damage, but others, such as the giant gardenslug (*Limax maximus*) can damage crops and compete with native land snails for resources. Any animal or plant that is not native to an area can upset the natural balance of the ecosystem.

Because land snails are not sufficiently studied, it is difficult for conservation specialists to assess the measures needed to protect them. You can help to conserve land snails, though. Learn to identify the snails in your area. Snails can be found in many habitats, even a small back yard. Look under rocks, logs and in leaf litter. Keep records of the snails you find. Write down the name of the snail, the date you observed it, precisely where you found it and in what type of habitat it was found (woods, wetland, urban, etc.). Take a photograph, if you can. Put the snail back where you found it and return any logs and rocks to their original position. Note any trends in your observations and report them to scientists in your area. Allow part of your property to remain natural with fallen logs and leaf litter to provide snail habitat. Join a shell club or malacological society, such as the Chicago Shell Club or the Conchologists of America.



Life History

Most land snails are **hermaphrodites**, possessing both male and female sex organs and gametes. When snails mate, fertilization often occurs in both individuals, and both lay a clutch of from one to at least 20 eggs. Clutch number varies by species. Generally, the larger the snail, the more eggs it will lay. Snails lay their eggs in spring and fall. Eggs are deposited in a cool, damp place, often just under the soil's surface. The adult snail provides no care for the eggs. Hatching takes place in about seven to 10 days. The young snails emerge and begin to search for food immediately. Young slugs have the same appearance as the adults, while young snails have one body whorl at first.

Several adaptations help snails to survive. A snail's external skin contains glands that produce **mucus**. The mucus prevents the snail from drying out and also helps it move. During very hot, dry weather and during very cold periods, snails and slugs may become inactive. When a snail **aestivates** (hot weather) or hibernates (cold weather), it produces a thick mucus membrane over the opening of the shell to prevent further desiccation. Homing tendencies help snails to return to the same sheltered area after activities, reducing the risk of traveling to a potentially dangerous habitat.

Most Illinois land snails are **detritivores**, eating decaying vegetation, such as leaves. Some snails are **carnivores**, feeding on other snails or carrion. In Illinois, the gray-foot lancetooth snail (*Haplotrema concavum*) eats other land snails. It has a thin, elongated "neck" that it inserts into the shell of other snails. Its special barbed teeth then attack the flesh of the prey snail.

Snails need to seek sheltered places to live, eat and rest. They prefer to live in moist areas and are commonly found under logs, loose bark or coarse woody debris, and in leaf litter on the forest floor. In general, snail populations are greatest in areas that have high soil calcium levels. Calcium is needed by snails to produce the shell and to regulate body functions.

Land snails move by gliding on a large, muscular foot. The muscles in the foot contract in waves in the same direction that the animal is moving. Each wave allows the muscles to grip the substrate and pull the snail forward. Glands in the foot produce mucus to help the snail move along. Snails do move very slowly. One snail was recorded to be moving at 0.0023 mph.

Snails are a food source for many animals. Some insects eat land snails. Firefly larvae feed almost exclusively on snails. Land snails are an essential part of the diet of many birds. During periods of egg-laying, female birds that normally eat snails increase their snail consumption. The calcium in snail shells is a nutrient vital to embryonic development and egg shell production in birds.

Glossary

aestivation period of inactivity when temperatures are high enough to be stressful to an organism

auricle a chamber of the heart that receives blood from the veins

carnivore animal that preys upon and eats other animals

chiton also called sea cradle, this mollusk lives on rocks in the ocean and has a shell made of hard, overlapping plates

conical cone-shaped

denticle a small, toothlike projection

detritivore an organism that eats dead plant or animal materials

discoid having a flat, circular shape, like a discus

dorsal the back or upper side of an animal

hermaphrodite organism possessing both male and female reproductive organs **hibernation** period of inactivity in winter during which an organism has

reduced metabolic functions

mantle the part of a mollusk that surrounds the organs and lines and secretes the shell

mucus a thick fluid secreted by mollusks that assists them in movement and protection; helps prevent the body from drying out

pneumostome an opening in the **mantle** of a gastropod where air can enter for breathing

radula a flexible band with small teeth in the mouth of most mollusks;

used to scrape food

scaphopod a burrowing, marine mollusk with a long, tapering shell

tentacle an elongated, unsegmented extension from a snail's head used for sensory purposes

ventral belly or lower side of an animal

ventricle lower chamber of the heart; receives blood from the auricle and

pumps it to the snail's tissues

whorl one of the turns of a spiral shell

Species Descriptions

Measurements indicate largest shell dimension for snails and longest body length for slugs.

Appalachian pillar *Cochlicopa morseana* (Doherty, 1878) – 1/4 inch – This glossy, spindle-shaped snail is found in and around rotting logs and leaf litter.

armed snaggletooth *Gastrocopta armifera* (Say, 1821) – 1/8 inch – The shell of this snail has projections, called teeth or **denticles**, in its aperture that help protect its soft body from being eaten by insect predators.

bladetooth wedge *Xolotrema fosteri* (F. C. Baker, 1921) – 5/8 inch – The bladetooth wedge is named for its prominent denticle, or toothlike structure, on the parietal surface of its shell. It is one of the most common land snails in the state.

brittle button *Mesomphix friabilis* (W. G. Binney, 1857) – 7/8 inch – This shiny snail frequents moist woodlands. It has a blue-tinged body and a somewhat flexible, translucent shell.

broad-banded forestsnail *Allogona profunda* (Say, 1821) – 1 inch – The broad-banded forestsnail once lived in Illinois because shells of this species are present. Populations exist in neighboring states, so it is possible that the species may still survive here.

bronze pinecone *Strobilops aeneus* Pilsbry, 1926 – 1/8 inch – Raised ribs are a recognizable trait of the bronze pinecone's shell. In the shell's interior, there are also raised ridges, called lamellae. The lamellae may serve as stabilizing structures when the snail is in motion.

Carolina mantleslug *Philomycus carolinianus* (Bosc, 1802) – 2 inches – The Carolina mantleslug is one of Illinois' native slugs. It prefers moist, deciduous woodland habitats and does not invade gardens. When disturbed, it emits very sticky mucus to detract predators.

carinate pillsnail *Euchemotrema hubrichti* (Pilsbry, 1940) – 3/8 inch – Empty shells from the graceful, lens- or flying saucer-shaped snail, the carinate pillsnail were discovered in Illinois in 1939. Several small populations of living individuals were later discovered on limestone bluffs in southern Illinois, the only place on earth they exist.

cherrystone drop *Hendersonia occulta* (Say, 1831) – 1/4 inch – The cherrystone drop is rarely found in Illinois. It has a thick shell and an operculum, or a hard, flexible covering, that protects the soft body when the animal is withdrawn into its shell.

compound coil *Helicodiscus parallelus* (Say, 1817) – 1/8 inch – The compound coil looks like a neatly wound coiled rope. It occurs widely across Illinois in leaf litter and near human habitations.

depressed ambersnail *Oxyloma peoriense* (Wolf, 1894) – 3/8 inch – Named for Peoria, Illinois, the locality from where it was first described, this snail is known from only a small number of locations in the state. It has a distinctive oval shape and flexible shell.

domed supercoil *Paravitrea significans* (Bland, 1866) – 3/16 inch – Translucent and shiny, the domed supercoil has a distinctly shaped, sloping aperture and a tightly coiled, dome-shaped shell.

dusky arion *Arion subfuscus* (Draparnaud, 1805)
– 3 inches – This slug is introduced from Europe.
It generally lives around human habitations and can be a garden pest.

globose dome *Ventridens ligera* (Say, 1821) – 1/2 inch – The globose dome tolerates a wide range of habitats over the state, including areas disturbed by humans.

gray fieldslug *Deroceras reticulatum* (Müller, 1774) – 2 inches – The gray fieldslug, believed to have originated in western Europe, has successfully invaded many areas of the world. It can become a garden pest. This animal emits milky-white mucus when disturbed and can self-amputate its tail when threatened.

gray-foot lancetooth *Haplotrema concavum* (Say, 1821) – 3/4 inch – A voracious predatory snail, the gray-foot lancetooth has a specially adapted **radula** with barbed toothlike projections that enable it to eat the flesh of other snails. Its elongated neck region permits it to extend into the shell of its helpless victim. It is the only predatory land snail in Illinois.

ice thorn *Carychium exile* I. Lea, 1842 – 1/16 inch – This tiny snail has a translucent, white-tinged shell and lives in moist leaf litter, sometimes in great numbers. It is fairly common in Illinois deciduous woodlands.

Iowa Pleistocene snail *Discus macclintocki* (F. C. Baker, 1928) – 1/4 inch – Once believed to be extinct, living populations of this snail were discovered in 1955. It occurs in very limited areas in northwestern Illinois. This glacial relict species was fairly common in a large area south of the ice during the last Ice Age, but as the climate warmed, most of the individuals died. Those that survived live in areas that remain cool year round. The Iowa Pleistocene snail is a federally endangered species.

Roger's snaggletooth *Gastrocopta rogersensis* Nekola and Coles, 2001 – 1/10 inch – Roger's snaggletooth is the most recently discovered and named snail species in Illinois. It lives on limestone bluffs in a few places along the Mississippi River.

small spot *Punctum minutissimum* (I. Lea, 1841) – less than 1/16 inch – Aptly named, the small spot is about the size of the period at the end of this sentence. It is one of the smallest land snails in Illinois. While it is not as easily found as larger snails, it is abundant in leaf litter.

striped whitelip *Webbhelix multilineata* (Say, 1821) – 1 inch – This multiply striped snail occupies wet habitats, such as near swamps and on river banks.

thin-lip vallonia *Vallonia perspectiva* Sterki, 1893 – 1/16 inch – A tiny, white snail with a ribbed sculpture, the thin-lip vallonia lives in openings in woods or in fields.

tigersnail *Anguispira alternata* (Say, 1816) – 7/8 inch – A common snail, this species is easily recognized by the vivid rust-colored markings on its shell. It is often found in large numbers.

toothed globe *Mesodon zaletus* (A. Binney, 1837) – 1 inch – This large, round snail is widely distributed in Illinois and is common in hardwood forests. Its shell has a broadly reflected lip, or outer edge of the opening, and a denticle on the parietal surface.

whitewashed rabdotus *Rabdotus dealbatus* (Say, 1821) – 1/2 inch – This species was recorded in the first half of the 20th century in Illinois but has not been observed alive in the state since then. Southern Illinois is at the northernmost boundary of its range, and it is questionable as to whether this species is still living in the state.

Agency Resources

Although there is little information available about snails and slugs, several institutions in Illinois maintain research collections. The Field Museum of Natural History and the Peggy Notebaert Nature Museum, both in Chicago, and the Illinois Natural History Survey in Champaign, have significant collections and conduct studies. Other organizations, such as the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources, support research of these species. The Illinois Wildlife Preservation Fund, comprised of taxpayer donations, helps to support further understanding of these creatures by providing grants for projects, such as the development of this poster. Publications about mollusks and other topics can be ordered through the order form at http://dnr.state.il.us/teachkids.



The snail species shown in this photograph occur in Illinois. Photo © 2008, Marla L. Coppolino.

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